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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/825,064

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EXAMINER

MASKULINSKI, MICHAEL C

ART UNIT

PAPER NUMBER

2113

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

12/28/2006

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/825,064

Applicant(s)

HORI, SHINTAROH

Examiner

Michael C. Maskulinski

Art Unit

2113

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19-30 is/are allowed.
- 6) ☒ Claim(s) 1-4, 7-13, 16 and 18 is/are rejected.
- 7) ☒ Claim(s) 5, 6, 14, 15 and 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 4/14/04, 7/19/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

Non-Final Office Action

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 2, 7, 8, 9, and 11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

In claim 1, lines 14-15, a rebuild block overwriter that overwrites a rebuilt object block on one of the copied object block and an original object block that is an original of the copied object block is not supported in the Applicant's disclosure, for example paragraph 0044.

In claim 2, lines 10-11, said rebuild block overwriter overwrites said rebuilt object block on the one of said copied object block and said original block is not supported in the Applicant's disclosure, for example paragraph 0044.

In claim 7, lines 13-15, a rebuild block overwriter that overwrites a rebuilt object block on one of the copied object block and an original object block that is an original of the copied object block is not supported in the Applicant's disclosure, for example paragraph 0044.

In claim 8, lines 14-15, overwriting the rebuilt object block on the one of the copied block and the original object block is not supported in the Applicant's disclosure, for example paragraph 0044.

In claim 9, lines 15-17, a rebuild block overwriter that overwrites a rebuilt object block on one of the copied object block and an original object block that is an original of the copied object block is not supported in the Applicant's disclosure, for example paragraph 0044.

In claim 11, lines 9-10, overwriting the rebuilt object block on the one of the copied block and the original object block is not supported in the Applicant's disclosure, for example paragraph 0044.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 9 and 11-15 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 9 and 11-15 claim a recording medium on which a program is stored and variations thereof. These claims therefore are interpreted as recording a program per se. In order to overcome this rejection, language specifically stating the claim is limited to a computer program stored on a computer recordable medium executing on a computer.

Claim Rejections - 35 USC § 102

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5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4, 7-13, 16, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by “acm computing surveys” by Chen et al.

Referring to claims 1, 7, and 9:

a. On page 171, in Figure 10, Chen et al. disclose a storage system that stores block groups including a plurality of object blocks in a plurality of storage devices, one of said object blocks being a redundancy block comprising redundancy data used if one of the plurality of object blocks is defective.

b. On page 171, in Figure 10, Chen et al. disclose a plurality of storage devices.

c. On page 171, in Figure 10, Chen et al. disclose storing object blocks. A block writer for storing each of the plural of object blocks would be inherent to the system of Chen et al. On page 171, in column 1, Chen et al. disclose that parity sparing is similar to distributed sparing, except that it uses the spare capacity to store parity information (and a copied block copied from any of plural storing object blocks in different storage devices).

d. On page 171, in column 1, Chen et al. disclose that when a disk fails, the disk array simply converts to simple parity (a block rebuilder responsive to a defect being detected in an uncopied one of said object blocks, to rebuild a

corresponding defective object block based on stored ones of the object blocks other than said defective object block; and a rebuild block overwriter that overwrites a rebuilt object block on one of the copied object block and an original object block that is an original of the copied object block).

Referring to claims 2 and 11:

a. On page 171, in Figure 10, Chen et al. disclose wherein for each of said block groups, said block writer stores in said different storage devices each of said plurality of object blocks included in the block group and said copied block

b. On page 165, in column 2, Chen et al. disclose that accesses to a parity stripe with an invalid sector trigger reconstruction of the appropriate data immediately onto a spare disk (wherein if one of said storage devices is defective, then for each of said block groups in which an uncopied object block is stored in said defective storage device, said block rebuilder rebuilds said defective object block based on object blocks other than the object block stored in said defective storage device, and wherein for each of said block groups in which an uncopied object block is stored in said defective storage device, said rebuild block overwriter overwrites said rebuilt object block on the one of said copied object block and said original block).

Referring to claims 3 and 12, on page 171, in Figure 10, Chen et al. disclose that said block writer stores each of said plurality of object blocks and a copied object block that is copied from said redundancy block in said different storage devices.

Referring to claims 4 and 13:

- a. On page 154, in column 2, Chen et al. disclose that write requests must update the requested data blocks and must compute and update the parity block. Parity is easily computed by exclusive-oring the new data for each disk (a request receiver to receive a write request for a write of write data to a plurality of data blocks that are said plurality of object blocks other than said redundancy block and a redundancy block generator to generate a new redundancy block based on said plurality of data blocks to which the write data is to be written, on said write data, and on an original redundancy block).
- b. On page 155, under section 3.2.7, Chen et al. disclose P+Q redundancy (and wherein said block writer writes said write data to said plurality of data blocks to which the write data is to be written and writes said new redundancy block to said original redundancy block and to said copied block).

Referring to claim 8:

- a. On page 171, in Figure 10, Chen et al. disclose controlling a storage system to store in plural storage devices block groups that comprise plural object blocks and one of said object blocks being a redundancy block comprising redundancy data used if one of the plurality of object blocks is defective.
- b. On page 155, under section 3.2.7, Chen et al. disclose P+Q redundancy (storing in different storage devices each of the plural object blocks and a copied block that is copied from any of one of the plural object blocks).
- c. On page 165, in column 2, Chen et al. disclose that accesses to a parity stripe with an invalid sector trigger reconstruction of the appropriate data

immediately onto a spare disk (wherein if one of said storage devices is defective, then for each of said block groups in which an uncopied object block is stored in said defective storage device, said block rebuilder rebuilds said defective object block based on object blocks other than the object block stored in said defective storage device, and wherein for each of said block groups in which an uncopied object block is stored in said defective storage device, said rebuild block overwriter overwrites said rebuilt object block on the one of said copied object block and said original block).

Referring to claim 10, on page 150, in Figure 2, Chen et al. disclose a computer program stored on a computer readable medium for performing the RAID 6 function.

Referring to claim 16:

- a. On page 150, in Figure 2, Chen et al. disclose a controller for a data storage system, said controller comprising a first interface for coupling to an information processor and a second interface for coupling to a plurality of data storage devices, said controller being responsive to read and write requests received through said first interface for reading data from, and for writing data to, respectively, said plurality of data storage devices through said second interface.
- b. On page 154, in column 2, Chen et al. disclose that write requests must update the requested data blocks and must compute and update the parity block. Parity is easily computed by exclusive-oring the new data for each disk (said controller further comprising a request receiver and a reply transmitter for coupling to said information processor through said first interface, said controller

further comprising a redundancy block generator, a block rebuilder, a data storage device defect detector, a block writer, a block reader and a rebuild block overwriter all of which are coupled to said plurality of data storage devices through said second interface and that cooperate to store block groups in a dispersed fashion in plural ones of said data storage devices, where each of said block groups is comprised of object blocks comprised of plural data blocks and at least one redundancy block for use by said block rebuilder for error recovery purposes in response to said defect detector detecting a defect).

c. On page 155, under section 3.2.7, Chen et al. disclose P+Q redundancy (where said block writer operates to store, in different ones of said storage devices, each of the object blocks as a plurality of uncopied blocks and as a copied block that is a copy of one of said object blocks).

d. On page 171, in column 1, Chen et al. disclose that when a disk fails, the disk array simply converts to simple parity (where said block rebuilder operates, in response to said defect detector detecting a defect in a storage device that stores one of said uncopied blocks, to rebuild the corresponding defective block as a rebuilt block)

e. On page 165, in column 2, Chen et al. disclose that accesses to a parity stripe with an invalid sector trigger reconstruction of the appropriate data immediately onto a spare disk (and said rebuild block overwriter operates to overwrite the rebuilt block into the copied block unless the copied block corresponds to the defective block).

Referring to claim 18, on page 155, under section 3.2.7, Chen et al. disclose P+Q redundancy (where said copied block is a copy of said redundancy block).

Allowable Subject Matter

7. Claims 5, 6, 14, 15, and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. Claims 19-30 are allowed.

9. The following is a statement of reasons for the indication of allowable subject matter.

Referring to claim 5, the prior art does not teach or reasonably suggest wherein said block writer stores each of said plural storing object blocks and said copied block copied from any of plural data blocks that are said plural storing object blocks other than said redundancy block, in said different storage devices.

Referring to claim 14, the prior art does not teach or reasonably suggest wherein said first computer executable instructions stores in said different storage devices each of said plurality of object blocks and said copied block that is copied from any of plural data blocks corresponding to said plurality of object blocks other than said redundancy block.

Referring to claim 17, the prior art does not teach or reasonably suggest that the copied block is a copy of one of said data blocks.

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Referring to claims 19, 22, 25, and 28, the prior art does not teach or reasonably suggest upon detecting a defective storage device, rebuilding (N-2)/N of the stripes such that, for a given one of the stripes, the stripe is rebuilt if the block that is stored on the defective storage device is other than a copied block or an original block from which the copied block was made.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited prior art is related to the implementation of RAID 6 and other RAID devices.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael C. Maskulinski whose telephone number is 571-272-3649. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Beausoliel can be reached on 571-272-3645. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Michael C Maskulinski
Examiner
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